

CHBE 303

Computer-Aided Analysis of Chemical and Biomolecular Processes

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E-mail: dna6@rice.edu

Office: B235 Abercrombie

Class Room: Online

Laboratory: Online

Office Hours: TBD

Class Hours: 9:45 a.m. — 10:40 a.m. (MW)

Lab Hours: TBD

Teaching assistants

Waiting for final confirmation on graduate student TA
Nickolas Chen (UG, McMurtry College)

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Course Description

Programming literacy is indispensable in modern Chemical Engineering practice. Programming literacy encompasses two inter-dependent aspects: (1) gaining proficiency in the programming language, an aspect that involves learning the elements that constitute the language, and (2) computational thinking, an aspect that is independent of the programming language and is a skill that is broadly applicable to **all problem solving and analysis**. This course will introduce both aspects using problems and realistic applications in Chemical and Biomolecular Engineering.

Course Objectives

As the semester evolves, **our syllabus is subject to change** to best accommodate our learning objectives within whatever situation that prevails at that time. Our overarching objective is:

to get you on the path to using computational methods to solve technical problems that you will encounter in scientific and industrial practice.

1. Understand the MATLAB interface, the editor, and how to save and execute programs
2. Gain familiarity with MATLAB help features and commonly used intrinsic mathematical functions

3. Understand and appropriately use MATLAB data types
4. Learn about scripts and functions and when to deploy each
5. Understand basic Boolean algebra, logical operations, truth value of statements and their use in programming
6. Learn the concept of iteration in programming (FOR and WHILE loops)
7. Learn the concept of selection in programming (IF, IF-ELSE, IF-ELSEIF, SWITCH-CASE)
8. Understand and use modularization in programming
9. Learn to prepare aesthetically pleasing graphs using MATLAB
10. Develop computational thinking by coding numerical algorithms that address realistic problems that one encounters in Chemical and Biomolecular Engineering.
11. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Required Reading and Software

- Class notes and allied reading material that will be posted on Canvas
- In lieu of a class textbook, please get the student version of MATLAB (available for free for Rice students) — please see: <https://kb.rice.edu/page.php?id=74615>
- Please note that if you get the Rice version, you **will need** to be on Rice VPN to get the license information to run the code. If you want to avoid this, please purchase the software (cost \$99) from Mathworks. (Having your personal copy of Matlab may prove useful if your internet connection is flaky and/or you want to work from places that create a problem for you to get on Rice VPN.)
- A textbook is **not required**. But students desirous of a book-style reference may want to look at the texts by Hahn and Valentine *Essential MATLAB* or Stormy Attaway *MATLAB: a practical introduction to programming and problem solving*.

Course Organization

We will discuss the organization in detail when we meet online and I will post the plan as part of notes for week # 1. The organization below is provisional — in this age of covid, it seems prudent to add that disclaimer. Of course, after discussing with you all, I am open to amending and tuning the organization to best meet the needs of all of my students.

- I will post the recorded lecture for the coming week ahead of time. It is your responsibility to go through the lecture and be ready for the class.

- Every week, I plan to post a continuing (formative) assessment on Canvas. I expect you to work on this assessment during the first 15 minutes of the class. Rest of that time and the subsequent class in that week we will solve problems. The computer labs have been one of the most important and most enjoyable aspect of CHBE 303. During the lab, with my TAs, I got to meet each of you individually. We plan to replicate this by meeting students in small (3-4 student) online groups to foster more one-on-one interaction.
- Within reason and consistent with our course objectives, we plan to collaborate with CHBE 301 and also be a bridge to CHBE 305. Specifically, we envision working through problems (in-class or as part of assignments) that will involve material from CHBE 301, CHBE 303, and ideas that anticipate more extensive discussion in CHBE 305.
- The course will also comprise four or five (summative) assignments which will be designated as non-pledged (see Honor code policy below)
- Two (summative) assignments will be pledged (see Honor code policy below)

Honor code Policy

Students are encouraged to talk to each other, the teaching assistants, or the instructor about any assignment in the course that is not specifically designated as pledged. In the physical space, I have had an open door policy, but that will be impossible to replicate in the online format. But after discussions with you all, after the first week of classes, I will try to create blocks of time when I will be available on Zoom for you to drop in and chat.

For assignments that are pledged, you can **only discuss with the instructor and/or TAs**; you cannot consult any other resource (excluding MATLAB help files). For all assignments, submitted solutions to assignments may not be copied from any source.

ADA Statement

Any student with a documented disability needing academic adjustments or accommodations is requested to speak with the instructor during the **first two weeks of class**. All discussions will remain confidential. Students with disabilities will need to also contact Disability Support Services in the Allen Center.

Title IX Responsible Employee Notification

Rice University cares about your wellbeing and safety. Rice encourages any student who has experienced an incident of harassment, pregnancy discrimination or gender discrimination or relationship, sexual, or other forms interpersonal violence to seek support through The SAFE Office. Students should be aware when seeking support on campus that most employees, including myself, as the instructor/TA, are required by Title IX to disclose all incidents of non-consensual interpersonal behaviors to Title IX professionals on campus who can act to support that student and meet their needs. For more information, please visit safe.rice.edu or email titleixsupport@rice.edu.

For more information about Title IX, please contact Title IX Compliance Officer Richard Baker.

Celebrating your progress

We will evaluate your progress through the course using the following rubric.

Topic	Weight %
MATLAB Onramp	10
Continuing assessments	20
Non-pledged assignments	40
Pledged assignments	30

Late assignments will incur a penalty of 10% / day after the submission deadline. (In past years, this penalty used to be 20% / day; while we rarely needed to use this, on rare occasions we have had to do this. But in the age of covid, we are mindful of the challenges everyone is facing. If you have challenges that prevent you from submitting the assignment on time, please let the instructor know right away.)

Provisionally, we plan to follow the distribution below in assigning letter grades. Past experience suggests a class average of approximately 85; reasonable adjustments will be made if the average drops much below our expectation.

Grade	%	Grade	%
A+	≥ 98	C+	68.0 – 72.9
A	93.0 – 97.9	C	60.0 – 67.9
A-	88.0 – 92.9	C-	55.0 – 59.9
B+	83.0 – 87.9	D	50.0 – 54.9
B	78.0 – 82.9	F	< 50
B-	73.0 – 77.9		